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***Scientific Progress for Whom? The Uses and Abuses of Science in 19-21st Century English Literature***

***Theme***

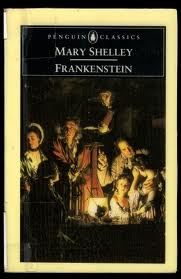
Since the enlightenment, many 19th-, 20th-, and 21st-century intellectuals, immersed in rigid models of logic and reason, have been obsessed with acquiring scientific knowledge in the ideological pursuit of “progress.” In an era of imperial conquest, scientific theories proliferated in England, Europe and North America. Many of these theories were used to justify the racism, sexism, and ableism that allowed powerful white subjects to objectify and other racialized people and territories. While I would not deny the socially-conscious achievements science has enabled through the years, this text set will explore the myriad social injustices that have been perpetrated in the name of scientific progress. When science is divorced from ethics and is fuelled solely by concerns of power and profit, its “objectivity” becomes a shield for its abuses.

***Purpose and Rationale***

The purpose of this text set is to engage English students in questions of science, ethics, and social justice, both past and present. In interest surveys with students at both of my practicum placements, an overwhelming majority of them admitted that science was their favourite subject because it was “objective,” “practical,” and “helps people.” My goal with this set is to foster a love of English literature in various forms by appealing to a pre-existing interest, and to complicate and expand students’ notions of the utility and purpose of science in society. The purpose is not to scare students out of their love of science, but to enhance and deepen their understanding of how scientific knowledge is connected to power, and the importance of questioning who wields this power and for what benefit.

As students explore the abuses of science in pursuit of progress, they will learn to question what this ideology masks and who benefits from scientific advancement. Students will read dystopian visions of scientific progress. They will see textual artifacts that exemplify the objectification of the racialized other. They will hear how scientific theories were used to legislate ableism, sexism, and racism in Canada and abroad. And they will learn about biocolonialism, and explore how media texts can create allies in the struggle for social justice, equity, and Indigenous rights. This text set aims to critically raise students’ consciousness so that their future scientific endeavours will not repeat the horrors of the past. As George Santayana’s words at Auschwitz suggest, “the one who does not remember history is bound to live through it again.”

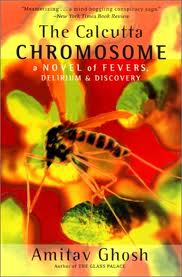
***Frankenstein* by Mary Shelley (1818)**

****Summary:** Set in 19th-century England, *Frankenstein* begins with a letter from Captain Walton to his sister, wherein he describes his dogged quest to acquire knowledge of the “dangerous mysteries” of the North Pole. On his journey, he encounters Dr. Victor Frankenstein, a brilliant scientist on the brink of death. Victor then recounts his obsessive pursuit of scientific knowledge. He narrates his upbringing, including the death of his mother and his studies of galvanism, which he used to spark life into a huge creature composed of body parts collected from corpses. He shares how he recoiled from his creation once his experiments had proven successful and the “monster” had come to life. When Victor returns home after his brother’s death, the monster approaches him to recount its own story.

The monster shares its longings for acceptance and love, which were rebuffed by the humans he encountered. He demands that Victor create a mate for him, which Victor cannot complete, being plagued by fears of a new “race.” In retribution, the monster kills Victor’s best friend and his wife, leading Victor to the North Pole in the hopes of destroying it. Walton then takes up the story, explaining that he must turn back because his ship is entangled in ice, against the pleading of Victor. Victor soon passes away, and Walton finds the monster on his ship, mourning the death of its creator. In its grief, the monster departs, promising to take its own life as it disappears into the dark sea.

**Rationale**: Shelley’s canonized novel anchors this set’s look at scientific ethics in literature. Among other things, *Frankenstein* explores the relentless pursuit of scientific knowledge divorced from ethical concerns, which will apply to students interested in science and those who question its prominence in society. Significantly, the novel does not discredit the uses of science, intrigued as it is with portraying the latest advancements in galvanism and chemistry. It does, however, question the abuses of science for personal gain. It asks who exactly benefits from scientific “progress,” and questions what a creator owes to creation. Layered on these concerns are questions of race and imperialism as the monster is thoroughly othered and denied its own race. In teen culture, the monster is often called Frankenstein, the name of its scientist-creator. We can thank Shelley for being among the first to suggest that monster and creator can be one and the same.

***The Calcutta Chromosome* by Amitav Ghosh (1995)**

**Summary:** In a relatively futuristic New York City, Antar discovers the digital identification card of a former colleague he once met. Murugan went missing in Calcutta in 1995, where he was exploring the work of Ronald Ross, the real-life winner of the 1902 Nobel Prize in Medicine for his insights into mosquitoes and malaria. The novel then shifts between New York City, Calcutta and 19th-century India, where Antar, Murugan and a female journalist, named Urmila, investigate the implications of Ross’s research. Ross’s lab tech was an Indian named Mangala, whose more spiritual take on disease stood in counterpoint to the rationalist, Western Ross. Murugan questions Ross’s reductive conclusions and the novel suggests a different cause for malaria without clearly defining it.

**Rationale:** Ghosh’s novel flits between different times, places, and characters, letting students explore the tension between novelistic form and content. While the novel can occasionally feel confusing, it is also action-packed and enjoyable, drawing in students who care more about story than structure. Thus, *The Calcutta Chromosome* functions both as an entertaining read and an edifying one, teaching students about malaria (which kills millions each year), the contorted process of scientific “discovery,” and how gender and colonialism have directed much of our “objective” scientific work. Furthermore, the novel connects scientific achievements in the colonial past to our postcolonial, networked future through Antar. As a result, students can explore how ethics and science have co-evolved over the last hundred years. They can also apply what they learn to their science classes. Teachers can use actual labs done in high school as case studies, deconstructing the process and asking students to question what influences their conclusions (e.g., how did their peers, teacher, society, etc., guide their hypotheses and conclusions).

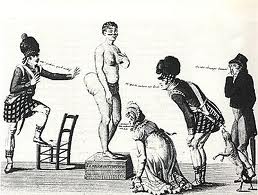
***Poster of Saartjie Baartman* (1810?)**

**Summary:** Baartman, a Khoikoi woman from South Africa, was taken to London and Paris in the early 1800s to be exploited, abused, and violated in the names of curiosity and science. She was objectified as a freak attraction before thousands of Londoners and was given the name “Hottentot,” as a pejorative for her ethnicity, and “Venus” to sexualize her appearance. A variety of historical artifacts, such as posters and scientific renderings, depict a nearly-naked Baartman for a European public’s consumption. Napoleon’s surgeon general no less staked a scientific claim on Baartman, examining her features and dissecting her organs all in the name of scientific progress. She died only five years after arriving in Europe.

**Rationale:** The many historical images that parade a nearly-naked Baartman powerfully exemplify the evils of scientific racism and its colonial connections. Baartman is thoroughly objectified in these images as the exoticized other. The poster makes the West’s horrific history of scientific exploitation driven by imperial fantasies of superiority and consumption of the other look and feel all-too real. This poster allows students to explore how the pursuit of scientific discovery and knowledge were used to justify the West’s economic and racial pillaging of colonized nations. Questions of how gendered and racialized bodies have been represented in history would also form part of the discussion, connecting to the current experience of many female *and* male students in today’s image-conscious society.

**“The Venus Hottentot (1825)” by Elizabeth Alexander (1962)**

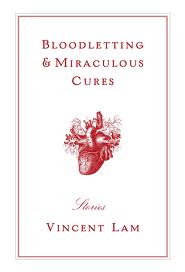
**Summary:** American poet, Elizabeth Alexander, wrote “The Venus Hottentot (1825)” about Saartjie Baartman. Her poem opens with the voice of Georges Cuvier, the scientist who examined her in life and dissected her organs after her death, preserving them at the Musee de l’Homme in Paris. The opening waxes lyrically on the beauty and wonder of science, seemingly at odds with the abuse done to this woman in science’s name. In the second half of the poem, Baartman speaks, telling the story of how she was deceived into leaving Africa with promises of riches and the abuse she endured and rage she had to stifle. In Baartman’s voice, we hear the intelligence, strength, and heartbreak that her captors tried to silence.

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**Rationale:** Alexander is a contemporary American poet, who is most famous for performing the inaugural poem at President Obama’s swearing-in ceremony. Many students will recognize and appreciate the Obama connection. Most will also be able to easily empathize with Baartman, regardless of race or gender, thanks to Alexander’s moving diction and powerful imagery. Her brief, evocative portrait reclaims Baartman’s body and voice from the deadening grasp of imperial science. At the same time, the poem resists a reductive condemnation of science. As beautifully expressed in the opening, Alexander lets the reader briefly consider the wonder and insights that can come from scientific exploration. She quickly contrasts this, however, with the ironic fanaticism of a scientist like Cuvier who commits unnatural abuse to understand the natural world.

**“A Long Migration” from *Bloodletting and Miraculous Cures* by Vincent Lam (2006)**

**Summary:** “A Long Migration,” is one of several short stories that form *Bloodletting and Miraculous Cures*. Lam’s collection features four medical students negotiating their personal and professional lives on the path to become doctors. “A Long Migration” tells the story of Chen’s heritage and family, focusing on his grandfather. Percival Chen was a Chinese expatriate, who enjoyed a fast-paced life in Vietnam before the war. He is now dying in Australia, and Chen must negotiate his contemporary medical interventions with the traditional curatives proposed for his grandfather from a distant age.

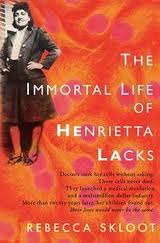
**Rationale:** Lam begins *Bloodletting and Miraculous Cures* with the quotation, “Medicine is a science of uncertainty and an art of probability.” These themes of scientific uncertainty versus human art permeate the stories that follow. In “A Long Migration,” Lam explores the tensions between immigration and integration, modern medicine and traditional healing, science and spirituality, and the personal and professional. As “objective” as science endeavours to be, it is still a human endeavour, subject to frailty, prejudice and culture. Chen’s scientific recommendations, for instance, are influenced by a constellation of factors, including his education, family, culture, ethnicity, and age. This story would lend itself well to a class debate about intergenerational conflicts that inform scientific ethics. Students can discuss whether it is true that younger generations more openly embrace scientific change, and what that could mean as we move into an era with a larger proportion of people who are elderly.

**“This is a Story” by Jeannette Armstrong (1990)**

**Summary:** “This is a Story” is set in the Okanagan territory, and is a retelling of a Coyote story. It is anthologized in Thomas King’s *All My Relations*. An indigenous woman narrates the story of Kiyoti, the trickster, who in other Okanagan stories teaches people to hunt salmon. In Armstrong’s retelling, Kiyoti takes on the role of saviour, travelling through the great Okanagan River until he comes across “a huge thing,” which turns out to be a dam. Kiyoti resents the dam because it has stopped the migration of salmon and changed the Okanagan way of life. When Kiyoti finds people fishing by a dam, he notes that they don’t even invite him to eat with them.

**Rationale:** Armstrong’s tale tells the story of cultural and environmental destruction thanks to White notions of scientific progress and development. Her use of Okanagan figures, symbols, and names would educate students about a strong Indigenous civilization that flourished in Canada before colonialism. Her critique of ecological destruction would reach students who fear for the environment and possibly prompt them to become allies for the cause of ecological *and* Indigenous rights. This text would expose the intersections between colonialism, ecology and race. Racialized peoples at home and around the world experience the destruction of their environments so that so-called “first-world” people can maintain their lifestyles.

***The Immortal Life of Henrietta Lacks* by Rebecca Skloot (2010)**

**Summary**: In 1951, Henrietta Lacks’ cancer was becoming fatal. At the same time, however, her cells were becoming immortal. In the coloured ward of Johns Hopkins hospital, doctors secretly extracted cells from this poor, black woman’s cervix and had cultured them in a laboratory so that they would live forever in the hands of scientists. They called them HeLa cells, using the letters from her first and last names, and they continue to be reproduced today for lifesaving genetics and cancer research. Lacks’ family knew nothing of the extraction until scientists began investigating their cells as well. Like their mother, however, Lacks’ children remained poor and uncompensated despite the profit scientists and corporations made from their mother’s suffering.

**Rationale:** Skloot’s work of investigative non-fiction presents a fascinating and damning portrait of scientific progress at its most prolific and most unjust. The lifesaving discoveries born of Lacks’ cells represent progress for some, but not for all. As students examine whose lives were saved with Lacks’ cells, they may come to question who benefits from current scientific discoveries and “advances.” Central to the concerns of scientific racism in Skloot’s text is also the profit motive, which minimized questions of ethics to maximize profits. Although material prosperity correlates with better health outcomes, scientists and corporations refused to extend the benefits to Lacks’ offspring in the manner of financial compensation.

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***Miss Evers’ Boys* by David Feldshuh (1990)**

**Summary:** Feldshuh’s play is based in part on *Bad Blood: The Tuskegee Syphilis Experiment,* a damning account of the Tuskegee Syphilis Study, a US-sponsored health survey, which followed poor black farmers who suffered through syphilis without treatment. His play approaches the subject from the perspective of four male participants and a black public health nurse. Act One is set back in 1932 when the men test positive for syphilis and receive six months of treatment until funds run out. At this point, the men are given a tiny life insurance policy to coerce them to continue participating in the study without treatment. Act Two follows the characters to 1972 when the US Senate conducts formal hearings to interrogate the study. In the meantime, the audience learns that the men have been denied Penicillin as a treatment, and they continue to watch Miss Evers negotiate her conscience.

**Rationale:** Like the Immortal Life of Henrietta Lacks, Miss Evers’ Boys was selected to educate students about real-life ethical controversies in the scientific and medical community. Students are well-versed in dystopian fiction and films that portray the abuse and deception of the public by a cold, calculating government driven by power and knowledge control. These two texts present some of the truth behind the fiction. It also raises controversial questions about whose bodies get regulated and tested in society, which could be extended to current debates about reproductive control that students would appreciate. *Miss Evers’ Boys* exploration of human experimentation, consent, and government exploitation should appeal to many students who feel powerless as teenagers in an institutionalized school system.

***The Leech and the Earthworm* by Debra Harry (2003)**

**Summary:** *The Leech and the Earthworm* explores the rising threat of biocolonialism, which is threatening Indigenous peoples’ autonomy and way of life around the world. This documentary critically examines the scientific, economic, and racial justifications for this practice, wherein certain scientists seek to penetrate Indigenous cultures and gene pools in the pursuit of medical progress. The documentary doesn’t merely critique biocolonialism, however, offering a different model of progress that recognizes the interdependence of people, land, and organisms.

**Rationale:** Students may not have heard of biocolonialism yet, but they likely will soon. It’s been the subject of recent books, news stories, and global debates among Indigenous peoples and certain scientists around the world. With the increasing emphasis on genetics in contemporary medical science, Indigenous peoples are being targeted for the rights to their genes. This documentary text will educate students about this new scientific practice that continues to other and abuse Indigenous peoples and cultures in the name of scientific progress. Students will be able to interrogate the scientific community’s current claims on racialized, Indigenous bodies to its past abuses after studying the case of Saartjie Baartman, among others. They will also continue to study how varied texts piece together history and current events, using diverse narrative, visual and auditory structures.

***The Living Archives on Eugenics in Western Canada Project* (2010-15)**

**Summary:** This website, maintained by the University of Alberta, and funded in part by the government, is a “community-university” initiative that seeks to create a living archive of Western Canada’s shameful eugenics abuses. The website features links to scholarly research, personal stories of abuse, art, literature and electronic artifacts. Eugenics, a type of social Darwinism whereby medical scientists sterilized the “unfit” so that they would not “pollute” a master race with their undesired genes, started in 19th-century imperial England. Although some social justice advocates denounced eugenic theories as malicious quackery, they became popular among governments in Europe and North America into the 20th century. Canada’s federal head of Maternal and Child Welfare, Helen MacMurchy, endorsed eugenics in the 1920s. In 1928, Alberta enacted the *Sexual Sterilization Act* to surgically sterilize "mental defectives.” Alberta and British Columbia continued to sterilize marginalized Canadians, particularly people with developmental disabilities, but also Indigenous peoples, single mothers, the poor, and Eastern Europeans until the early 1970s.

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**Rationale:** Lest students think the history of medicine in Canada is unsullied by incriminatory ethical controversies, this online text will quickly disillusion them. Students will be able to recall the stories of Nazi Germany’s horrific eugenics projects as context for this dreadful practice in Canadian history. In our discussion of scientific progress in the absence of scientific ethics, students would continue to examine how colonialism, racism, sexism, and now ableism have been used to justify shocking social injustices. In addition, students could explore how online texts are being written as living documents with links that complicate and expand traditional boundaries.

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